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Chapter 6

Meeting the challenges of implementing an intervention to promote work ability and health-related quality of life at construction worksites: a process evaluation

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Abstract

Objective: To evaluate the process of a prevention programme among construction workers.

Methods: The programme consisted of training sessions of a physical therapist and an empowerment trainer, and a Rest-Break tool. Data on seven process items were collected by means of questionnaires and interviews.

Results: Recruiting construction companies to participate was difficult. The therapists and trainer largely provided the training sessions as intended, but the Rest-Break tool was poorly implemented. Construction workers (n=171) showed high reach (84%), and moderate attendance rates (3 of 4 sessions). 64% of the construction workers recommended the overall programme to colleagues. Company size, economic recession, engagement of the management, and intervention year influenced dose delivered and satisfaction.

Conclusions: The study showed a successful reach, dose and fidelity, and moderate satisfaction. Furthermore, contextual factors played an important role during the implementation.

Introduction

In worksite interventions, randomised controlled trials (RCTs) have been recognised as a standard method to evaluate the effectiveness of outcomes. Despite the fact that RCTs offer the opportunity to control for several factors, such as confounding, selection bias and information bias, there are important factors that cannot be controlled by using this design.^{1,2} For instance, the implementation of interventions at the worksite is dependent on the context, such as the social climate at the worksite, and this is nearly impossible to control entirely.³ Process evaluations have been identified in the literature as an important tool to gain insight into the impact of these factors on the implementation of an intervention.^{3,4} However, the number of process evaluations alongside RCTs at the worksite is still limited. An explanation could be that funders are more interested in the outcomes of the intervention in terms of effectiveness.⁵

Nevertheless, process evaluations should be performed more often alongside RCTs in worksite settings as they can facilitate interpretation of study findings by providing more detailed information about the content and degree of the implementation of the intervention.⁶ For instance, it could turn out that, in practice, the intervention has not been executed as intended in the protocol (type III error).⁷ In that case, process evaluations may help researchers distinguishing between interventions that are not effective because of their predefined intervention protocol and underlying theories, and those that are not implemented adequately.^{1,8} Moreover, the information obtained from the process evaluation can be used to further improve decision making about programme modifications.⁹ Knowledge about the feasibility and implementation of an intervention also has benefits for other researchers to improve the development and implementation of comparable interventions in worksite settings.

Therefore, a process evaluation was conducted of an intervention programme in the construction industry. In this intervention, a 6-month programme was executed aimed at maintaining and promoting the work ability and health-related quality of life in order to support sustainable employability of construction workers.¹⁰ The intervention protocol consisted of two individual visits of a physical therapist, an instrument to raise awareness of the

importance of rest breaks to reduce fatigue, and two empowerment training sessions.¹¹ Because this intervention was implemented at many construction sites in different companies, a process evaluation is especially necessary as the intervention may be implemented and received differently among these worksites and companies.⁶ Thus, the aim of the present study was to evaluate the process of implementing a preventive intervention at different worksites in the construction industry.

Methods

The process evaluation was performed alongside a RCT on the effectiveness of an intervention at construction worksites. The Medical Ethics Committee of the VU University Medical Centre in Amsterdam approved the study and all participants signed informed consent. More detailed information on the methods, randomisation procedure, and outcome measures has been published elsewhere.¹¹

Study population

The study population for the process evaluation consisted of construction workers and supervisors working at the allocated intervention worksites, and trainers providing the intervention components. The construction workers were those performing the actual construction work (i.e., blue-collar workers). Supervisors were invited to participate as they had to manage the intervention at the worksite. All trainers (i.e., three physical therapists and one empowerment trainer) participated in the present study.

Intervention

The worksite prevention programme lasted six months and aimed to maintain and promote the work ability and health-related quality of life in order to support sustainable employability of construction workers. Following the Intervention Mapping protocol during the development of the intervention, two programme objectives were defined to improve work ability and health-related quality of life: (1) construction workers had to improve their balance between physical workload and need for recovery, and (2) construction workers had to improve their range of influence at the worksite.¹⁰

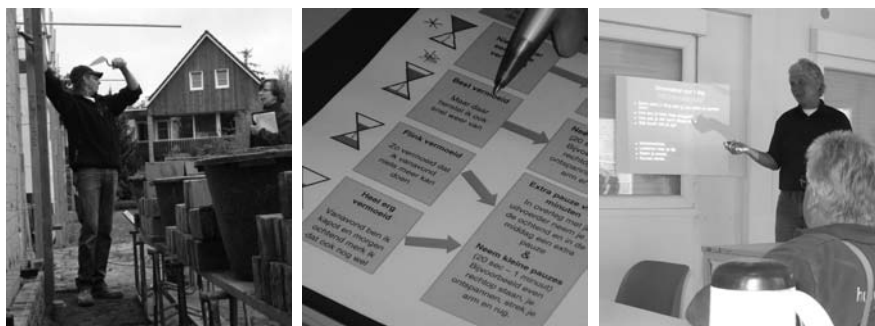


Figure 1. (A) Training session of the physical therapist, (B) Rest-Break tool, (C) Training session of the empowerment trainer

Regarding the first programme objective, the construction workers received two individual training sessions of a physical therapist and a Rest-Break tool. During the first training session of the physical therapist at the worksite, a quick scan questionnaire was followed by a 15-minute observation at the workplace (Figure 1.a). Based on this, three recommendations on how to reduce the physical workload were written down by the physical therapist on a pocket-size card. The recommendations were mainly focused on improvements in working style, work methods and rest breaks. Four months later at the second training session, the experiences so far were discussed and the impact of the advice was evaluated with the worker. The second part of the first programme objective was the introduction of the Rest-Break tool (Figure 1.b). This tool aimed to raise awareness about the importance of reducing fatigue by taking flexible rest breaks, and to stimulate to actually take rest breaks in order to reduce fatigue. The Rest-Break tool is a flowchart and consists of four steps: (1) the expectations of the workers about their fatigue at the end of the working day, (2) short term advice to take mini rest breaks or an additional break of ten minutes, (3) selection of the possible causes of fatigue, and (4) long term advice about structurally lowering fatigue. The workers were asked to fill in the tool weekly, alone or with colleagues, and they discussed the results with their supervisor.

As to the second programme objective, workers as a group received two interactive empowerment training sessions at the worksite to improve their influence at the worksite (Figure 1.c). The first training session consisted of five steps. During these steps, the workers created a list of topics they wanted to change during the intervention period, and they signed an action plan.

Examples of actions they planned to execute during the intervention period were improving the communication with the supervisor, asking for assistance during lifting tasks and taking additional rest breaks. Four months later at the second empowerment training session, the empowerment trainer and workers discussed, evaluated, and reconsidered the action plan as well as the results that were achieved.

To remind the workers during the intervention programme about the content of the program, several incentives were provided, such as a video, poster, and a banner.

Process aspects

Following the recommendation of Steckler and Linnan (2002), seven process aspects were assessed: recruitment, reach, dose delivered, dose received, fidelity, satisfaction, and context.^{5,12} These aspects were addressed by combining qualitative and quantitative data at different levels; company level, worksite level, and participant level.

Recruitment

Recruitment refers to the procedures used to approach and attract managers of construction companies to participate. During the recruitment phase, all approached companies, used procedures, and reasons for not participating were registered and collected in logs by the researchers.

Reach

Reach was defined as the number of workers who returned the baseline questionnaire. Reach included the workers allocated to the control group as well as to the intervention group. Reach was expressed by the proportion of workers who returned the baseline questionnaire compared to all workers receiving the baseline questionnaire.

Dose delivered

Dose delivered was defined as the number of intended intervention components that were actually delivered by the trainers. Two visits of a physical therapist including the introduction of the Rest-Break tool and two empowerment trainings sessions should have been provided to each intervention worksite. Data were collected using checklists, which were filled in by the trainers, regarding which worksites they visited. Therefore, dose delivered was

expressed as the proportion of worksites that received the components as described in the checklists compared to the number of all intervention worksites.

Dose received

Dose received refers to the proportion of construction workers in the intervention group that participated in the training sessions. Before the start of each training session, all workers had to sign a list to confirm their attendance. These lists were compared to all workers allocated to the intervention group.

Fidelity

Fidelity contains information about the extent to which the trainers delivered the programme according to protocol. The protocol containing information about the content and organization of the training sessions was written together with the physical therapist and empowerment trainer during the development of the intervention. Data were collected using logs of each training session received from the trainers, questionnaires at 3-month and 6-month follow-up, and semi-structured interviews with all trainers and with a sample of workers.

Satisfaction

Satisfaction with the overall content of the programme and the specific programme components was measured using 3-month (for the first training sessions) and 6-month follow-up questionnaires (for the second training sessions and the Rest-Break tool). Satisfaction was measured by using a 10-point scale (very unsatisfied to very satisfied). Moreover, workers were asked if they would recommend the programme or specific components for future implementation (yes/no). In addition to the questionnaires, semi-structured interviews were conducted with workers and supervisors to gain more in-depth insight in their satisfaction with the program, and their recommendations for future implementation. Based on the questionnaires, the average rates of the satisfaction with the intervention and components were categorized into poor (<6), moderate (≥ 6 and <7.5), or good (≥ 7.5).

Context

Contextual factors refer to characteristics that could facilitate or impede the implementation. Four factors (i.e., company size, intervention year, economic recession and engagement of the management) were selected during data collection. These factors were based on the input from the human resource managers of the companies and on discussions within the research team.

First, three companies had a medium company size (20 to 100 employees), whereas the other three companies had a large company size (≥ 100 employees). Second, three of the six companies participated in the development phase and started with the intervention programme in 2009, whereas the other companies started with the intervention in 2010. Third, the economic recession had large consequences for the construction industry in 2009 and 2010 as the working-stock decreased. As a consequence of the economic recession, one company had to lay-off workers and had to keep the remaining workers working part-time during the intervention programme. Fourth, the engagement of the management with the programme was characterized into low, intermediate, and high. Low engagement was defined as commitment of the management, but no further involvement of the management after baseline measurement. Intermediate engagement meant that the management committed themselves to the project and facilitated the implementation of the programme. High engagement meant that the management committed themselves to the project, facilitated the implementation of the programme as well as stimulated workers to participate in the project during the intervention period. The engagement of the management towards the programme was low in two companies, intermediate for three companies, and high for one company.

Data collection of the process aspects

As mentioned briefly in the former paragraph, data for the process evaluation were collected using i) questionnaires at baseline, and at 3-month and 6-month follow-up among construction workers, ii) logs and checklists completed by all trainers after each training session, iii) logs collected by the researchers during the entire project, and iv) semi-structured interviews with workers (n=22), supervisors (n=7), and occupational trainers (n=4).

The questionnaire at baseline was distributed to all construction workers that participated in the intervention. The questionnaires at 3-month and 6-month follow-up were only distributed among the construction workers allocated to the intervention worksites to gain insight in the implementation of the programme and the specific components, and included questions about fidelity, satisfaction and recommendations for future implementation.

Regarding the semi-structured interviews, workers within five companies were recruited based on the number of followed training sessions. Only workers who completed at least three training sessions were selected. Of these workers, a sample was asked to participate in the semi-structured interview based on their opinions about the program; a random sample of those who stated to be dissatisfied with the programme and a random sample of those who were very satisfied with the programme. As none of the workers refused, 22 workers in total participated in the interviews. Second, a random sample of supervisors was asked to participate in this study. Of the eight supervisors approached, one supervisor refused to participate because of time constraints. Third, all trainers participated in the semi-structured interviews. The semi-structured interviews with supervisors and workers were conducted face-to-face at the worksite, whereas the semi-structured interviews with the trainers took place at a location nearby their work. All semi-structured interviews were conducted by independent researchers not involved in the intervention before. With oral permission of the participants, the semi-structured interviews were audio-taped and fully transcribed.

Data analysis

Quantitative data were analysed using descriptive statistics (i.e., percentage, mean and standard deviation). To identify significant differences between attendance rates and recommendations for future implementation for each contextual factor, Pearson Chi-Square tests were performed. To identify significant influence of other variables, Mann-Whitney *U*-tests and Kruskal-Wallis tests were performed for the contextual factors. In all analyses, the Statistical Package of Social Sciences version 17.0 for windows (SPSS Inc. Chicago, Illinois, USA) was used.

All recorded semi-structured interviews were transcribed verbatim. Subsequently, the transcripts were read en reread to become familiar with the text. Next, textual segments were marked with open and axial codes indicating the content of the response. The codes were then grouped in themes related to process variables aspects (e.g., fidelity, satisfaction, and recommendation for future implementation). For all data extracted, a qualitative software programme (Kwalitan, version 5.09) was used to electronically code and manage the data.

Results

Recruitment

In total, 231 companies in the construction industry were approached by phone (Figure 2). Written information was sent to those that were interested (n=171; 76%). Initially, 34 companies that expressed their interest in the project were visited by the principal researcher to explain the development and implementation phase by an oral presentation. Main reasons for these companies not to participate were that they already participated in other health promotion activities, that not all members of the management were in favour of participation, and that there were insecure consequences of the economic recession. After the 34 visits, five companies committed themselves to the development and implementation phase. Two reasons to participate were the consecutive possibilities for companies to exert influence on the content of the programme and the intervention strategy, and the high percentage of sick-leave among their workers. Because of the economic recession, only three companies continued the project in the implementation phase. To reach the desired number of construction workers, three additional companies were invited to participate in the implementation phase by personal contacts of the researchers. Finally, six companies actually participated in the programme.

Reach

The baseline questionnaire was distributed at the worksite to 347 construction workers. The response of the baseline questionnaire between the companies varied from 77% to 100%, and was on average 84%. In total, 293 construction workers responded to the baseline questionnaire. Among them, 171 construction workers were working at the intervention worksites. For the process evaluation, a total of 121 construction workers (71%) responded to the questionnaire at 3-month follow-up, and 114 construction workers (67%) responded to the questionnaire at 6-month follow-up.

Dose delivered

The first training session from the physical therapist, which also included the introduction of the Rest-Break tool, was delivered to 91% of the intervention worksites, and the first empowerment training session was delivered to 90% of the intervention worksites. The second training session of the physical therapist was delivered to 90% of the intervention worksites, and the second empowerment training session was delivered to 95% of the

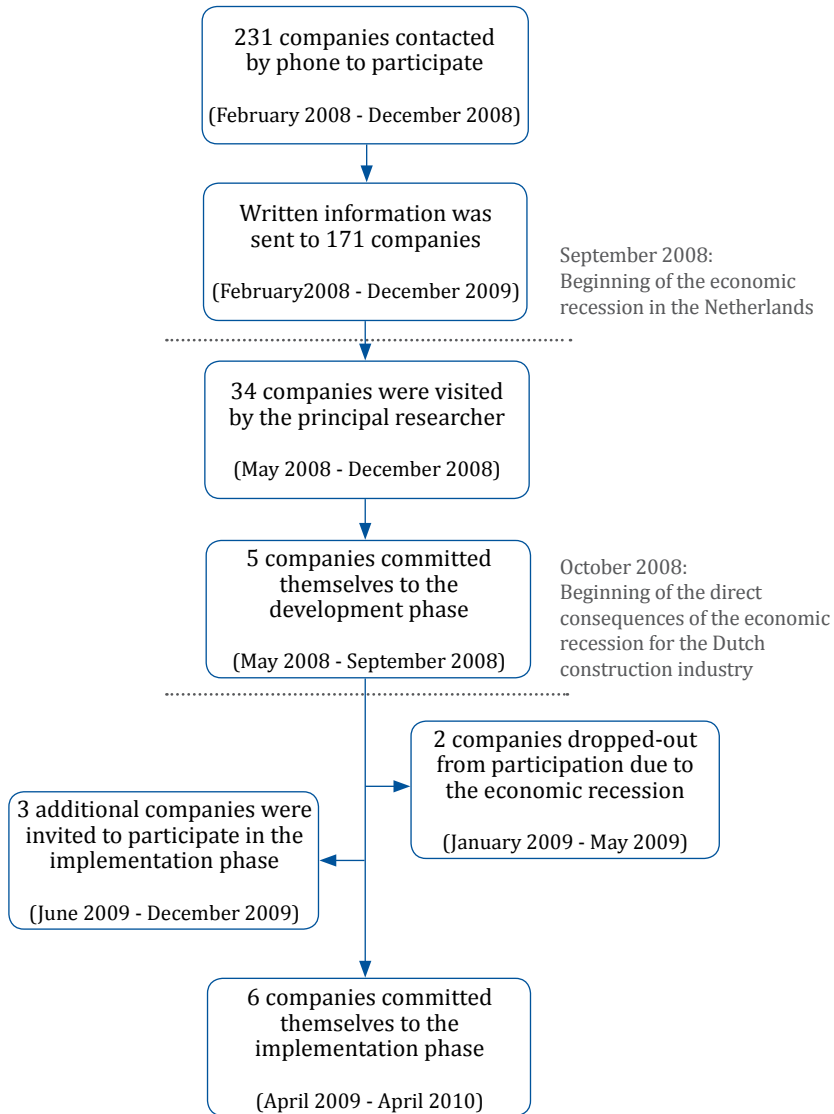


Figure 2. Flow diagram of recruited companies

intervention worksites. In two companies, all training sessions were delivered to all worksites. For two other companies, newly started worksites were not communicated in time, and therefore these worksites were missed. Due to time constraints in two companies, the second training session of the physical therapist was not provided to all workers of some small worksites (≤ 3 construction workers).

Dose received

Based on the checklists of the trainers, the first training session of the physical therapist was followed by 70% (n=120) of the construction workers whereas the first empowerment training session was followed by 67% (n=115) of the workers. The second training session of the physical therapist and empowerment trainer were followed by 59% (n=101) and 62% (n=107) of the workers, respectively. In total, 11% of the workers followed none of the training sessions, whereas 61% of them followed at least three training sessions.

During the intervention period, one company encountered huge consequences of the decreased working-stock due to the economic recession. Just before starting the intervention, this company had to lay-off workers and had to force the other workers to work part-time. Because of the high impact of this on the dose received, these workers (n=50) were excluded. Of the remaining construction workers, the first training session of the physical therapist was followed by 74% (n=90) of them (Table 1). The first empowerment training session was followed by 79% (n=95) of the workers. The second training session of the physical therapist and empowerment trainer was followed by 63% (n=76) and 73% (n=88) of the workers, respectively. In total, 5% of the workers followed none of the training sessions, whereas 70% of them followed at least three training sessions (Table 1).

Fidelity

The physical therapists visited the construction worksites to conduct a quick scan questionnaire and to observe the workers at their workplace individually. In the second training session, the physical therapist reconsidered the advice with the workers. Based on the questionnaires, the main topics that were discussed during the training session were lifting less during the working day (76%), working in right postures (74%), and taking additional rest-breaks during the working day (72%). At some worksites, the training session of the physical therapists deviated from the protocol. First, the workers were in some cases not trained individually. For feasibility reasons, construction workers of very small construction worksites (≤ 3 workers) were gathered to a larger worksite to follow the training session. Besides, some workers asked to be trained together with their colleague, as they always worked as a fixed couple. Second, based on the results of the questionnaires, the majority of the

Table 1. The proportion of workers (% (n)) who received the training sessions in total and for each contextual factor^a

	Total	Contextual factors						
		Company size		Year		Engagement		
		medium	large	2009	2010	low	medium	high
	n=121	n=41	n=80	n=68	n=53	n=8	n=85	n=28
Attendance of the training sessions %(n))								
The first training session of physical therapist	74% (90)	80% (33)	71% (57)	71% (48)	79% (42)	50% (4)	76% (65)	75% (21)
The first training session of empowerment trainer	79% (95)	80% (33)	78% (62)	69% (47)*	91% (48)*	75% (6)	75% (64)	89% (25)
The second training session of physical therapist	63% (76)	73% (30)	58% (46)	57% (39)	70% (37)	50% (4)	62% (53)	68% (19)
The second training session of empowerment trainer	73% (88)	85% (35)*	66% (53)*	66% (45)	81% (43)	75% (6)	73% (62)	71% (20)
Number of attended training sessions %(n))								
None	5% (6)	2% (1)	6% (5)	6% (4)**	4% (2)**	13% (1)	5% (4)	4% (1)
1-2 training sessions	25% (30)	22% (9)	26% (21)	34% (23)**	13% (7)**	38% (3)	27% (23)	14% (4)
3-4 training sessions	70% (85)	76% (31)	68% (54)	60% (41)**	83% (44)**	50% (4)	68% (58)	82% (23)

^a Company B was excluded from analyses (n=50); * p<0.05; ** the proportion of attended training session was higher for workers who started the intervention in 2010 compared to 2009 (p<0.05)

construction workers (61%) did not receive the advices on a pocket-size card at the end of the first training. The therapists mentioned several reasons for not handing out the cards: (a) two therapists found the card childish, (b) one therapist forgot to bring along the cards for one company, and (c) the workers themselves incidentally found the cards unnecessary. Third, two physical therapists commented on the duration of the training sessions. As workers with musculoskeletal symptoms needed more time than was estimated previously, less time was left for the other workers.

The fidelity of the Rest-Break tool, which was explained and handed-out to all workers during the first training of the physical therapist, was disappointing. The majority of the workers mentioned that the Rest-Break tool was easy to follow and to fill in. Of these workers, only 44% filled in the tool on a weekly basis. None of the interviewed workers discussed the advice with their supervisor, and the majority of them never used the advice in daily practice. The reasons that workers did not follow the advice were that they: 1) already took additional short rest-breaks when needed, 2) were not able to follow the advice from the tool at the worksite, or 3) did not know that the tool was for their own usage.

In general, the empowerment trainer conducted the training sessions according to protocol. The questionnaires (n=71) showed that the training sessions focused mainly on topics such as responsibility for their own health (80%), rest-breaks (73%), celebration of success achievement (73%), and teamwork (72%). The logs showed that working at a small worksite and having no involvement of the supervisors during the training sessions were barriers for conducting the training sessions according to protocol. The empowerment trainer deviated from the protocol in the first step. Because of time constraints during the training session, the protocol described that extra time with the workers beforehand was as a prior condition to get to know the workers and their worksite. However, in contrast to the protocol, the empowerment trainer was never present at the worksite beforehand.

Satisfaction

The construction workers who followed at least one training session rated the satisfaction about the programme as moderate ((6.5±1.2); Table 2). The interviewed workers were satisfied with the programme because

Table 2. Satisfaction with the programme (mean, sd) and recommendation for future implementation (%) among workers in total and for each contextual factor

	N	Total	Contextual factors								
			Company size		Year		Recession		Engagement		
			medium	large	2009	2010	no	yes	low	medium	high
Satisfaction ^a (mean (sd))											
Overall content of the programme	109	6.5 (1.2)	6.6 (1.1)	6.4 (1.2)	6.3 (1.3)	6.6 (1.0)	6.5 (1.2)	6.2 (1.2)	6.2 (1.1)	6.5 (1.3)	6.7 (0.9)
First training session of physical therapist	80	6.6 (1.7)	6.5 (1.3)	6.6 (1.9)	6.3 (2.0)	6.8 (1.3)	6.7 (1.6)	6.1 (2.0)	6.1 (1.9)*	6.4 (1.8)	7.4 (1.0)*
Pocket-size card	48	5.8 (2.1)	5.6 (2.3)	5.9 (2.0)	5.7 (2.3)	6.1 (1.8)	5.8 (2.0)	5.7 (2.5)	5.7 (2.5)	5.6 (2.2)	6.9 (0.7)
Advice from the therapist	80	6.6 (1.7)	6.4 (1.6)	6.7 (1.7)	6.3 (2.0)	6.9 (1.2)	6.6 (1.7)	6.6 (1.7)	6.5 (1.6)	6.3 (1.8)	7.3 (1.2)
Second training session of physical therapist	65	6.6 (1.8)	6.9 (0.9)	6.4 (2.1)	6.4 (1.8)	6.7 (1.7)	6.6 (1.8)	6.4 (1.4)	6.4 (1.3)	6.6 (1.6)	6.7 (2.4)
Rest-Break tool	73	5.3 (2.0)	5.4 (2.0)	5.2 (2.0)	5.5 (2.0)	5.0 (1.9)	5.3 (1.9)	5.2 (1.9)	5.1 (2.1)	5.4 (2.0)	5.2 (1.9)
First training session of empowerment trainer	80	6.2 (1.6)	6.5 (1.5)	6.0 (1.6)	6.1 (1.8)	6.2 (1.4)	6.2 (1.5)	5.7 (2.2)	5.9 (1.8)	6.2 (1.7)	6.2 (1.3)
Action plan	80	6.0 (1.7)	6.2 (2.0)	5.9 (1.5)	5.8 (1.8)	6.2 (1.6)	6.0 (1.6)	5.9 (2.0)	6.0 (1.7)	6.0 (1.9)	6.0 (1.3)
Second training session of empowerment trainer	80	6.2 (1.8)	6.5 (1.9)	6.0 (1.8)	6.0 (1.8)	6.4 (1.7)	6.2 (1.9)	6.4 (1.3)	6.1 (1.7)	6.2 (1.9)	6.3 (1.8)
Recommendation for future implementation ^b (%)											
Overall programme	106	64%	76%	59%	56%	75%	67%	53%	60%	64%	68%
Training sessions of the physical therapist	67	79%	96%*	69%*	69%*	90%*	83%	60%	69%	82%	80%
Rest-Break tool	70	47%	58%	41%	46%	49%	47%	50%	44%	49%	47%
Training sessions of the empowerment trainer	71	62%	70%	57%	49%*	77%*	59%	86%	70%	57%	73%

^a scale 1-10; with higher scores indicating a higher satisfaction; ^b yes/no; * p<0.05

their company acknowledged the importance of the workers' health, the programme combined different components, and they thought that "the programme may do some good". However, unsatisfied workers commented that the programme was too extensive and impractical. Based on the questionnaires, the programme was recommended by 64% of the workers for future implementation.

Workers were moderately satisfied with the first training session of the physical therapist and the accompanying advice (6.6 ± 1.7 and 6.6 ± 1.7), respectively) and the second training session (6.6 ± 1.8), whereas they were less satisfied with the pocket-size card (5.8 ± 2.1). The interviewed workers mostly liked the practical advice, the personal visits at the worksite, and the increased attention of their company to their physical health. The visit at the worksite and the personality of the physical therapist were mentioned as positive by the supervisors. However, a few workers and supervisors were concerned about the long-term effects of the training sessions. The majority of the workers recommended the programme (79%). For future implementation, the workers and supervisors recommended that the physical therapist should spend more time at the construction site.

As for the Rest-Break tool, the questionnaires as well as the interviews showed that both workers and supervisor were unsatisfied with the tool. Workers rated the tool with a 5.3 ± 2.0 on average. Although the majority of the workers were satisfied about the concept of the tool, some workers experienced difficulties in filling in their weekly status of fatigue on a scale. Negatively judged items were that the advice was often not feasible in daily activities, and workers of large companies became bored with the tool as they had the same work tasks for weeks. The supervisors agreed with these reasons for dissatisfaction. Almost half of the workers (47%) recommended the Rest-Break tool for future implementation. Examples to improve the feasibility of the tool were: lower frequency (e.g., monthly) to fill in the Rest-Break tool, feedback of the Rest-Break tool by the physical therapist, and a tool tailored to different professions.

The first training session of the empowerment trainer and the accompanying action plan were rated as moderate (6.2 ± 1.6 and 6.0 ± 1.7), and the second training session was rated comparable (6.2 ± 1.8). While six out of seven

supervisors were dissatisfied with the training sessions, the opinions across the workers differed. Those who were satisfied with the programme mentioned the personality of the trainer, the content of the program, and the action plan as positive. Negatively judged items were stereotyping the construction industry by the trainer, and the infeasibility to implement the solutions. For future implementation, the training sessions were recommended by 62% of the workers. The workers suggested that actual examples from the Dutch construction industry should be provided, and that the training sessions should be available for supervisors and white-collar workers as well.

Context

Regarding the dose received, table 1 showed the associations between each contextual factor and the attendance rates. In general, higher but no significant attendance rates were found among workers working in smaller companies, workers who started with the intervention in 2010, and workers working in companies with an engagement management towards the programme. The number of followed training sessions was significantly higher for workers who started with the intervention in 2010 compared to those who started in 2009. Regarding the satisfaction with the programme and the specific components, in general, a slightly higher but no significant appreciation was found among workers who started the intervention in 2010, who had no direct consequences of the economic recession, and who worked in a company with a high management engagement (Table 2). Regarding future implementation, significant more construction workers of smaller companies recommended the training sessions of the physical therapist compared workers of larger companies. Moreover, significant higher recommendation for future implementation of the trainings sessions of the physical therapist as well as empowerment trainer were found among workers who started in 2010 compared to those who started in 2009.

Discussion

This paper described the process of implementing a worksite prevention programme in the construction industry, using the framework of Steckler and Linnan. The intervention programme faced immense difficulties in recruiting companies, but yielded a high reach among workers of companies that finally participated in the study. The main results indicated that the protocol was largely implemented as intended by the physical therapist and empowerment

trainer. However, the Rest-Break tool was not used by the workers as described in the protocol. The satisfaction with the program, the training sessions of the physical therapist as well as the empowerment trainer was moderate, whereas the Rest-Break tool was rated as unsatisfactory. Furthermore, working in a smaller company (< 100 employees), higher management engagement towards the program, and participation in the second year of the intervention positively influenced the implementation of the intervention.

Comparison with other studies

The participation rate among construction companies was extremely low; only 6 of the 234 companies (3%) participated in the implementation of the intervention. An explanation for the low participation could be that the content and requested additional time and costs were unknown during the recruitment phase. Thus, in agreement with previous studies^{13,14}, time demands and costs were factors playing an important role in decision making to participate in an intervention.

Once companies committed themselves to implementing the intervention, the focus moved towards the recruitment of the workers in these companies. Because participation of blue-collar workers in intervention studies is in general low¹⁵, recruitment strategies were chosen to increase the reach among the workers. One way to stimulate the participation rates in the present study was to involve workers in the development of the intervention using the Intervention Mapping protocol.^{4,10} Other strategies to obtain higher participation rates were the commitment of the management¹⁶ and the personal invitation of the researchers at the worksite. These strategies apparently worked well as the participation of workers in the current study (84%) was higher than in most worksite health promotion programmes (10-64%)^{17,18}.

Concerning the dose delivered of the intervention, almost all worksites (90%-100%) received the training sessions. This is in line with previous studies.^{17,19} Also the dose received of the training sessions was satisfactory (61% of the workers followed three or four training sessions), and was in line with other worksite intervention studies.^{15,17,19} Explanations for the satisfying attendance rates were that the training sessions were organized at the worksite and within the existing training system in the Dutch construction industry¹⁰, and

that the workers participated in company time.¹⁶ Unfortunately, the usage of the Rest-Break tool was unsatisfactory as only half of the workers filled in the tool on a weekly basis.

Regarding the fidelity of the implementation, it should be noticed that implementing an intervention also includes balancing between the interests of the researchers, who want to standardize the components, and the interests of the trainers, who need to adapt the intervention to the local setting.^{20,21} Thus, despite the fact that the protocol was developed with the trainers, the physical therapist needed to modify the protocol occasionally when it could not be applied completely. In contrast to the training sessions, the Rest-Break tool was not implemented as intended in the protocol. Although half of the workers filled in the tool on a weekly basis, the majority of them never used the advice in daily practice. The main reason for this was that workers already took additional short rest-breaks when necessary.

The construction workers rated the overall content of the programme as moderate. The interviews showed that workers and supervisors were very positive about the training sessions of the physical therapist. The opinions about the empowerment training session differed among the workers, whereas the opinions about these training sessions were mainly negative among the supervisors. This was surprising as the intervention was developed in collaboration with the workers. However, it might be explained by the fact that the empowerment training aimed to change work on an organizational level, which was new for both supervisors and workers. However, 64% of the workers still recommended the intervention for future implementation. The interviews showed that the satisfaction about the intervention may be improved when the recommendations for modifications of the intervention (e.g., more visits from the physical therapist, availability of the empowerment trainer for the white-collars as well) are followed.

Several contextual factors influenced the implementation of the intervention. Although the consequence of the economic recession was apparent during the entire intervention program, it is unknown how this exactly influenced the results of the present study. It could be hypothesised that construction workers experienced high job insecurity and that they were less able to dedicate themselves to the intervention entirely. Moreover, as one company

actually had to lay-off workers and had to force the other workers to work part-time, the economic recession negatively influenced the dose received in the present study. In addition, working for a company of smaller size and with higher management engagement towards the programme were other factors that positively influenced the dose received and satisfaction. A smaller company size^{15,16} as well as high engagement of the staff^{22,23} were already recognised by previous studies as success factor for participation rate or satisfaction. Also better results for dose received, satisfaction and future recommendations were achieved when implementing the intervention in 2010 compared to 2009.

Based on the results of the different process aspects, the question arises whether the implementation of the intervention failed or succeeded. To indicate the extent to which the intervention has been implemented and received by the construction workers, some process aspects can be used to calculate a composite score.⁵ Thus, 293 of the 347 workers approached (84%) agreed to participate in the intervention programme. Because of the high impact of the economic recession on company B, these workers (n=51) were excluded from the process variable dose received. Of the remaining 120 workers in the intervention group, 69 workers (58%) received at least three sessions and rated the programme as moderate to good (score of 6 and higher). Drawing conclusions about the implementation of the programme based on this number is still hard as there is no cut-off point to determine whether implementation was successful or had failed.⁵ When analysing the effectiveness of the intervention, per-protocol analysis based on these process outcomes should be performed.

Strengths and weaknesses

First, by following this framework, researchers were forced to write down a process evaluation plan a priori. As a result, all data could be collected from the beginning of the project. Collecting input from all stakeholders about the programme is the second strength of this study. The programme can be modified based on this input and will therefore be feasible for all of them for future implementation. Third, the present study collected both qualitative and quantitative data. Qualitative research is often criticized as it lacks reproducibility, is subjected to researcher bias and lacks generalizability.²⁴ However, while quantitative data provide an overview on how well the intervention is implemented, qualitative data can complement this in exploring the underlying motives of the findings.²⁵

Some methodological limitations should be considered as well. First, socially desirable answers could be expected because the questionnaires were filled in together with colleagues and within the presence of the principal researcher. To be sure to avoid this kind of response bias during the interviews, an independent researcher interviewed the workers individually. Second, we should be aware of selection bias as only construction workers who at least followed three training sessions were interviewed. However, to encounter this bias, workers with a high satisfaction as well as workers with a lower satisfaction towards the overall programme were invited for the interviews. Third, recall bias needs to be taken into account, since the interviews took place three to nine months after the intervention. Therefore, some relevant information for recommendation for future implementation could be missed. Fourth, we did not collect sufficient information about the implementation of the Rest-Break tool. To obtain more detailed information, the usage of the Rest-Break tool should actually have been monitored during the intervention period.

Implications for future research

Based on the findings of the current study, some lessons can be learned for future researchers who are planning to conduct an intervention study at the worksite. First, implementing an intervention at different companies and across different worksites is a dynamic process with many external influences. It is therefore recommended that researchers focus on possible contextual factors, from drawing the protocol until the very end of the intervention. Thereby, researchers should distinguish between factors that are suggestible (e.g., engagement of the management towards the program) and those that are not (e.g., company size) because they both might ask for different strategies to improve the implementation of an intervention. For instance, implementing an intervention in a larger company is more difficult compared to smaller company. As a strategy for implementing an intervention in a larger company, researchers should spend more time on spreading out the information and exact time schedules of the intervention. Moreover, some unexpected factors could also occur during the implementation of the intervention such as the economic crisis. It is important to notice and monitor these factors as it will help researchers how to interpret the effectiveness of the outcomes. The second lesson learned from the present study is the importance of conducting a full pilot. The results showed that implementation was more successful in

the second intervention year compared to first intervention year. Due to time constraints, new materials such as the Rest-Break tool were piloted only once, whereas other components were not tested among the target group at all. Hence, initial shortcomings could have been corrected when a full pilot was performed.

Implications for practice

When implementing the intervention at a larger scale in the construction industry, implementers (e.g., trainers, managers of trade unions or companies) should consider some challenges. First, some adaptations on the intervention should be made based. In the current study, the physical therapist needed to proceed pragmatically in situations where the protocol could not be applied completely. Thus, various scenarios that can be encountered in daily practice need to be outlined in the protocol. Besides, more involvement of the supervisor during the empowerment training sessions is recommended. Because the training sessions aim to change work on an organizational level, it is important that supervisors and managers also are in favour of this cultural change. Therefore, providing training sessions for the supervisors and other white-collar workers of the company might be valuable. Moreover, the Rest-Break tool is not usable in the current form because the tool was rated unsatisfactory and the advices were not followed. Thus, more qualitative research (i.e., interviews and focus groups) is needed to explore which solutions might be more appropriate to reduce fatigue. Second, as the results from the present study showed the importance of the contextual factors at construction worksites, it is important to be aware of them for future implementation. For instance, to implement an intervention successfully, it is important that the managers are engaged towards the programme. Implementers should invest more time in convincing less engaged managers about the value of the intervention for their company. The third challenge is to optimize the collaboration within the multidisciplinary team (e.g., physical therapists, empowerment trainer, human resource managers, supervisors and workers). To optimize the cohesion between the training sessions of the physical therapist and empowerment trainers, it is recommend that both trainings sessions will be provided by the same company. Besides, to keep all stakeholders of the company involved in the project, implementers should inform each of them regularly.

Conclusion

The results of the present process evaluation show that (i) the willingness to participate was low among the companies but notably higher among construction workers in the participating companies, (ii) the training sessions were largely implemented according to the protocol, whereas the Rest-Break tool was poorly implemented, (iii) 64% of the workers recommended the intervention for future implementation and the training sessions of the physical therapist were recommended by 79% of them. Furthermore, working in a smaller company (< 100 employees), having a higher management engagement towards the program, experiencing no direct consequences of the economic crisis, and participating in the second year of the intervention were contextual factors that positively influenced the implementation of the intervention.

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